

ABSTRACT

A metal seed layer on a substrate is pre-cleaned prior to formation of an electrochemically deposited metal fill layer. A liquid-based pre-clean may include, for
5 example, an agitated rinse, an etchant solution, a surfactant solution and/or a solvent solution to remove organic and/or other contaminants from the metal seed layer. A dry pre-clean may utilize, for example, a hydrogen and/or an oxygen plasma to remove contaminants and/or reduce a
10 metal oxide of the seed layer. In at least one embodiment, the reduction of the metal oxide may occur at a pressure in excess of 0.1 atmosphere.